

Work Order ID 84657

May-30-12 3:54:28 PM

\*84657\*

U/R

Page 1

Item ID: D350-748-141TRN

Accept

\*N9000040100\*

Setup Start

\*NS1\*

Revision ID: U/R

Item Name: Crosstube Turning Detail

Stop

\*NS2\*

Start Date: 17/05/2012 Start Qty: 1.00

\*1\*

Cust Item ID:

Required Date: 22/05/2012 Req'd Qty: 1.00

\*1\*

Customer:

Reference:

Approvals:

Process Plan: MLJ

Date: 12/05/31

Tooling:

Date:

QC:

Date:

SPC (Y/N):

Date:

Run Start

\*NR1\*

Stop

\*NR2\*

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
--------------------------------	--------------------------	----------------------	---------	--------	--------------	---------------	---------------	------------------	----------------

Draw Nbr

Revision Nbr

D350-748-141

F U/R OK CP FA 12.31

100

0.00

\*100\*

MORI SEIKI CNC LATHE LARGE

Mori Seiki

Memo

0.00

Mori Seiki CNC Lathe Large

1-Fill tube with sand & install plugs on both ends as per Folio FA648

2-Turn first side as per Folio FA648

3- File transition lines smooth.

FOLIO REV: 44

DWG REV: F

1 / 12-11-25

7b →

110

QC1- Inspect dimensions to dimension sheet

0.00

\*110\*

QC

Memo

0.00

Quality Control

1 / 12-11-25

W/O: 84657		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: D350-748-141TRN PAR #: \_\_\_\_\_ Fault Category: Cross tubes / machining NCR: Yes No DQA: Not Date: 13/02/07  
 Resolution: as is Disposition: as is QA: N/C Closed: ✓ Date: 1

NCR: 13-2300		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			
12/12/4	1W	ULTRASOUND deviation over tol. Rc material	DAS 12 12/12/4	Min well is within 0.020" of nominal dimension (0.136) Acceptable.	DAS 12 12/12/4	TW 12-12-10	DAS 12 12/1/31	S 12/2/5

NOTE: Date & initial all entries

# Work Order ID 84657

**\*84657\***

Page 2

May-30-12 3:54:28 PM

Item ID: D350-748-141TRN

Accept

**\*N900040100\***

Setup Start **\*NS1\***

Revision ID: U/R

Item Name: Crosstube Turning Detail

Stop **\*NS2\***

Start Date: 17/05/2012 Start Qty: 1.00

**\*1\***

Cust Item ID:

Required Date: 22/05/2012 Req'd Qty: 1.00

**\*1\***

Customer:

Reference:

Approvals: Process Plan: \_\_\_\_\_ Date: \_\_\_\_\_ Tooling: \_\_\_\_\_ Date: \_\_\_\_\_

Run Start **\*NR1\***

QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_

Stop **\*NR2\***

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
--------------------------------	--------------------------	----------------------	---------	--------	--------------	---------------	---------------	------------------	----------------

120

0.00

**\*120\***

MORI SEIKI CNC LATHE LARGE

Mori Seiki

Memo

0.00

Mori Seiki CNC Lathe Large

1-Turn second side as per Folio FA648  
2- File transition lines smooth.  
3-Scribe Part & Batch as per Dwg D350-748-141  
FOLIO REV: AF  
DWG REV: F

1 Ø \_\_\_\_\_ \_\_\_\_\_  
*mark*  
*12/11/27*

130

QC1- Inspect dimensions to dimension sheet

0.00

**\*130\***

QC

Memo

0.00

Quality Control

1 Ø \_\_\_\_\_ \_\_\_\_\_  
*mark*  
*12/11/27*

140

QC8- Inspect parts - second check

0.00

**\*140\***

QC

Memo

0.00

Quality Control

JW 12-12-10

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries

# Work Order ID 84657

**\*84657\***

Page 3

May-30-12 3:54:28 PM

Item ID: D350-748-141TRN

Accept

**\*N900040100\***

Setup Start

**\*NS1\***

Revision ID: U/R

Item Name: Crosstube Turning Detail

Stop

**\*NS2\***

Start Date: 17/05/2012 Start Qty: 1.00

**\*1\***

Cust Item ID:

Required Date: 22/05/2012 Req'd Qty: 1.00

**\*1\***

Customer:

Reference:

Approvals:

Process Plan:

Date:

Tooling:

Date:

Run Start

**\*NR1\***

QC:

Date:

SPC (Y/N):

Date:

Stop

**\*NR2\***

Sequence ID/  
Work Center ID

Operation  
Description

Set Up/  
Run Hours

Tool ID

Tool #

Plan  
Code

Accept  
Qty

Reject  
Qty

Reject  
Number

Insp.  
Stamp

150

0.00

**\*150\***

Large Fab

0.00

Crosstubes

Memo

1-DRILL HOLES FOR HEAT TREAT USING DT9806(HOLES MUST BE  
ALIGNED ON SAME LINE ON BOTH CUFFS)

Crosstubes

2-Grind machining marks

*Handwritten:* RM 12-12-12  
TW 12-12-12

160

Outsource process - Heat Treat

0.00

**\*160\***

Outsource1

Memo

0.00

Outsource process - Heat Treat

Issue P/O: *17654*  
Heat Treat to min 180 KSI As per Dwg D350-748-141  
(MIL-T-6736 OR AMS 2759-1C)  
Sand Blast tube after Heat Treat  
Possible Supplier: Vac Aero  
Ensure Certificate of Conformity is attached

*Handwritten:* 12-18-12

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries

# Work Order ID 84657

**\*84657\***

Page 4

May-30-12 3:54:28 PM

Item ID: D350-748-141TRN

Accept

**\*N900040100\***

Setup Start **\*NS1\***

Revision ID: U/R

Item Name: Crosstube Turning Detail

Stop **\*NS2\***

Start Date: 17/05/2012 Start Qty: 1.00

**\*1\***

Cust Item ID:

Required Date: 22/05/2012 Req'd Qty: 1.00

**\*1\***

Customer:

Reference:

Approvals:

Process Plan:

Date:

Tooling:

Date:

Run Start **\*NR1\***

QC:

Date:

SPC (Y/N):

Date:

Stop **\*NR2\***

Sequence ID/  
Work Center ID

Operation  
Description

Set Up/  
Run Hours

Tool ID

Tool #

Plan  
Code

Accept  
Qty

Reject  
Qty

Reject  
Number

Insp.  
Stamp

170

Receive & Inspect for Damage & Mat'l Certs

0.00

**\*170\***

Packaging

Memo

0.00

Packaging

Ensure certificate of conformaty is attached

6/3/12 (1)

180

QC6- Inspect dimensions to drawing

0.00

**\*180\***

QC

Memo

0.00

Quality Control

DAS 16 3/1/24

190

Packaging

0.00

**\*190\***

Packaging

Memo

0.00

Packaging

Identify and stock in kanban rack  
Location: LG

0 JAN 13-01-21

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries



Work Order ID 84657

\*84657\*

Page 5

May-30-12 3:54:28 PM

Item ID: D350-748-141TRN

Accept

\*N900040100\*

Setup Start \*NS1\*

Revision ID: U/R

Item Name: Crosstube Turning Detail

Stop \*NS2\*

Start Date: 17/05/2012 Start Qty: 1.00

\*1\*

Cust Item ID:

Required Date: 22/05/2012 Req'd Qty: 1.00

\*1\*

Customer:

Reference:

Approvals: Process Plan: \_\_\_\_\_ Date: \_\_\_\_\_ Tooling: \_\_\_\_\_ Date: \_\_\_\_\_

Run Start \*NR1\*

QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_

Stop \*NR2\*

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
--------------------------------	--------------------------	----------------------	---------	--------	--------------	---------------	---------------	------------------	----------------

200	QC21- Final Inspection - Work Order Release	0.00							
-----	---	------	--	--	--	--	--	--	--

\*200\*

QC

Memo

Quality Control

0.00

13/1/31

MCS 13-01-31

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries

# Picklist Print

May-30-12 3:54:31 PM

Page 1

Work Order ID: 84657

\*84657\*

Parent Item: D350-748-141TRN

\*D350-748-141TRN\*

Parent Item Name: Crosstube Turning Detail

Start Date: 17/05/2012

Required Date: 22/05/2012

Start Qty: 1.00

Required Qty: 1.00

Comments: IPP Rev:A New Issue 08-03-06 DD verified by:ec  
 IPP Rev B Removed polish 08.04.02 EC verified by : DD  
 IPP Rev C Remove LPS-3 08.06.23 EC verified by DD IPP Rev C  
 11.02.24 as per dwg rev.F DD verf: JLM

Component Item ID/ Item Name	Replacement Item ID	Mfg/ Purch	Bin Item	Primary Location	Last Location	Route Seq ID	Unit of Measure	Qty on Hand	Qty per Kit	Total Qty	Qty Issued	Date Issued	Status
D6015-125		Manufactured	No			110	Each	38.0000	1	1			

\*D6015-125\*  
 Crosstube Material

\*\*

Location	Loc Qty	Loc Code
HALL	38	
61380	4	
72511	34	

810221

1

KC 12-11-25

W/O:		WORK ORDER CHANGES						
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector	

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries

<b>DART AEROSPACE LTD</b>	<b>Work Order:</b> 84657
<b>Description:</b> Crosstube Assembly (AS350/355 High Fwd)	<b>Part Number:</b> D350-748-141
<b>Inspection Dwg:</b> D350-748-141 <b>Rev:</b> F	<b>Page 1 of 1</b>

### FIRST ARTICLE INSPECTION CHECKLIST

	Inspection Sheet Drawing Dimension	Tolerance	Actual Dimension	Accept	Reject	Method of Inspection	Comments
SIDE A	2.240	+0.005/-0.000	2.242	-		vern	CNC-08
	2.180	+0.005/-0.000	2.181	-			
	2.180	+0.005/-0.000	2.182	-			
	2.237	+0.005/-0.000	2.240	-			
	2.272	+0.005/-0.000	2.276	-			
	2.306	+0.005/-0.000	2.311	-			
	2.339	+0.007/-0.000	2.343	-			
	2.339	+0.007/-0.000	2.244	✓			
	0.062	+/-0.010	.062	✓		vern	CNC-08
	4.26	+/-0.030	4.26	-		"	
	R0.063	+/-0.010	.063	-		RG	
	R0.50	+/-0.030	.500	-		"	
SIDE B	2.240	+0.005/-0.000	2.242	-		vern	CNC-08
	2.180	+0.005/-0.000	2.182	-			
	2.180	+0.005/-0.000	2.182	-			
	2.237	+0.005/-0.000	2.240	-			
	2.272	+0.005/-0.000	2.277	-			
	2.306	+0.005/-0.000	2.311	-			
	2.339	+0.007/-0.000	2.343	-			
	2.339	+0.007/-0.000	2.344	✓			
	0.062	+/-0.010	.062	✓		vern	CNC-08
	4.26	+/-0.030	4.26	-		"	
	R0.063	+/-0.010	.063	-		RG	
	R0.50	+/-0.030	.500	-		"	
	110.27	+/-0.060	110.26	✓		TAPE	LG-15

<b>Measured by:</b> KC	<b>Audited by:</b> JW	<b>Preliminary Approval:</b>
<b>Date:</b>	<b>Date:</b> 12-12-10	<b>Date:</b>

Rev	Date	Change	Revised by	Approved
A	06.11.09	New Issue (P/O D350-748-101)	KJ/JLM	
B	07.10.24	Dwg Rev updated	KJ/EC/DD	
C	11.01.20	Dwg Rev updated	KJ	
D	11.07.26	Tolerance revised for 2.339 dimensions	KJ	

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

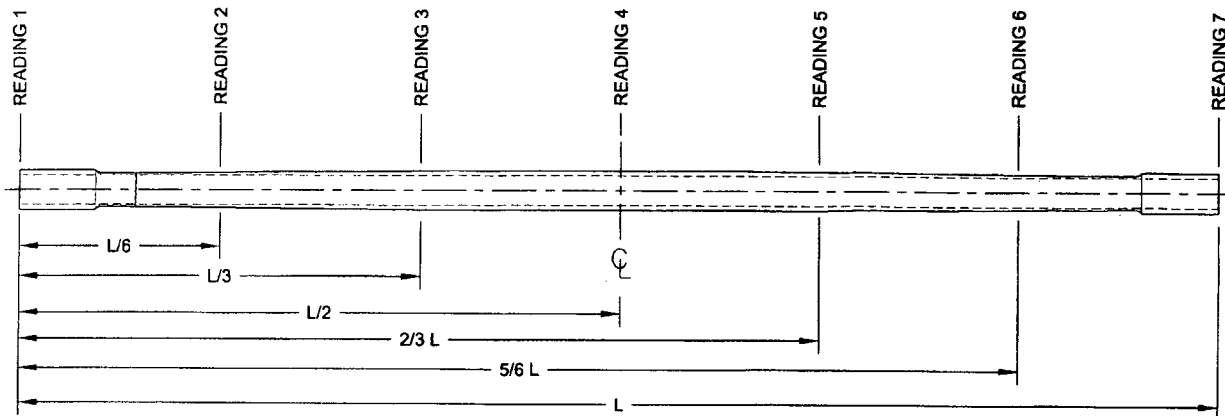
Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

<b>DART AEROSPACE LTD</b>		<b>Work Order:</b>	
<b>Description:</b> Crosstube Assembly (AS350/355 High Fwd)		<b>Part Number:</b>	<b>D350-748-141</b>
<b>Inspection Dwg:</b> D350-748-141 <b>Rev:</b> F		<b>Page 2 of 2</b>	

### WALL THICKNESS MEASUREMENT



Location	WALL THICKNESS MEASUREMENT (IN)				Deviation $\Delta w$ (max-min)	TOLERANCE
	w1	w2	w3	w4		
READING 1 L= 0"	.122	.123	.125	.124	.003	0.030"
READING 2 L= 11	.096	.091	.114	.115	.024	
READING 3 L= 22	.144	.124	.146	.160	.036	
READING 4 L= 55	.172	.171	.181	.181	.010	
READING 5 L= 22	.151	.139	.134	.143	.017	
READING 6 L= 11	.109	.104	.099	.100	.010	
READING 7 L= CUFF	.118	.127	.130	.122	.012	

#### Calibration Result

Actual Block Thickness: .100 .500

Sitiescan 250 Measured Thickness: .100 .500

<b>Measured by:</b> <u>gmm, l</u>	<b>Audited by:</b> <u>TD</u>	<b>Preliminary Approval:</b>
<b>Date:</b> <u>12/11/28</u>	<b>Date:</b> <u>12-12-10</u>	<b>Date:</b>

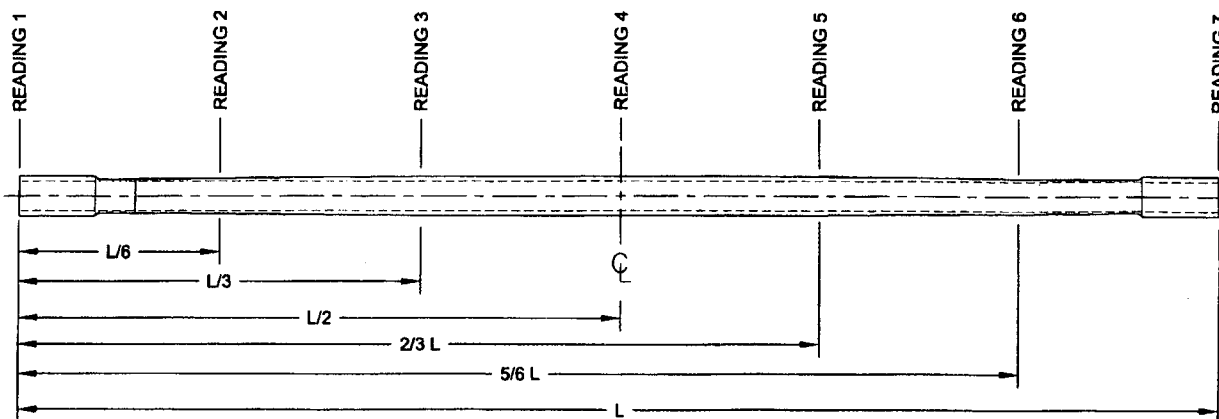
Rev	Date	Change	Revised by	Approved
A	06.11.09	New Issue (P/O D350-748-101)	KJ/JLM	
B	07.10.24	Dwg Rev updated	KJ/EC/DD	
C	11.01.20	Dwg Rev updated	KJ	
D	11.07.26	Tolerance revised for 2.339 dimensions	KJ	
E	12.06.04	Wall thickness form added	KJ	<u>TD</u>





<b>DART AEROSPACE LTD</b>	<b>Work Order:</b>	
<b>Description:</b> Crosstube Assembly (AS350/355 High Fwd)	<b>Part Number:</b>	<b>D350-748-141</b>
<b>Inspection Dwg:</b> D350-748-141 <b>Rev:</b> F		<b>Page 2 of 2</b>

### WALL THICKNESS MEASUREMENT



Location	WALL THICKNESS MEASUREMENT (IN)				Deviation $\Delta w$ (max-min)	TOLERANCE
	w1	w2	w3	w4		
READING 1 L= 0"	.124	.117	.116	.121	.008	0.030"
READING 2 L= 18.378	.111	.109	.140	.145	.036	
READING 3 L= 36.756	.166	.162	.173	.180	.018	
READING 4 L= 55.135	.167	.171	.180	.176	.013	
READING 5 L= 73.513	.175	.175	.175	.170	.005	
READING 6 L= 91.891	.126	.122	.126	.129	.007	
READING 7 L= 110.27	.112	.129	.125	.114	.017	

#### Calibration Result

Actual Block Thickness: 100-200

Sitiescan 250 Measured Thickness: 100-200

<b>Measured by:</b> <u>KC</u>	<b>Audited by:</b>	<b>Preliminary Approval:</b>
<b>Date:</b> <u>13-1-24</u>	<b>Date:</b>	<b>Date:</b>

Rev	Date	Change	Revised by	Approved
A	06.11.09	New Issue (P/O D350-748-101)	KJ/JLM	
B	07.10.24	Dwg Rev updated	KJ/EC/DD	
C	11.01.20	Dwg Rev updated	KJ	
D	11.07.26	Tolerance revised for 2.339 dimensions	KJ	
E	12.06.04	Wall thickness form added	KJ	

NCR: Yes / No

**WORK ORDER NON-CONFORMANCE / UPDATE**

DQA: \_\_\_\_\_ Date: \_\_\_\_\_

QA Closed: \_\_\_\_\_ Date: \_\_\_\_\_

Work Order: _____  Part No. _____  NCR No. _____	<b>DISPOSITION</b>  Rework <input type="checkbox"/> Scrap <input type="checkbox"/> Use-as-is <input type="checkbox"/> Work Order Update <input type="checkbox"/>	<b>AGAINST DEPARTMENT/PROCESS</b>  <div style="display: flex; justify-content: space-between;"> <div>           Skid-tube <input type="checkbox"/>            Machining <input type="checkbox"/>            Thermoforming <input type="checkbox"/>            Large Fab <input type="checkbox"/> </div> <div>           Crosstube <input type="checkbox"/>            Small Fab <input type="checkbox"/>            Finishing <input type="checkbox"/>            Composite <input type="checkbox"/> </div> <div>           Water Jet <input type="checkbox"/>            Prod. Eng. Coord. <input type="checkbox"/>            Rec/Store/Packaging <input type="checkbox"/>            Supplier <input type="checkbox"/> </div> <div>           Engineering <input type="checkbox"/>            Quality <input type="checkbox"/>            Other <input type="checkbox"/> </div> </div>
--	---	---

Root Cause	Date	Step	Qty	Description of work order update or Non-conformance	Initial Chief Eng	Action Description	Sign & Date	Verification	QC Inspector
Doc/Data									
Equip/Tooling									
Operator									
Material									
Setup									
Other									
Process									
Supplier									
Training									
Unapproved									

**FAULT CATEGORY**

Landing Gear	General	Other
<input type="checkbox"/> Bending	<input type="checkbox"/> Bend	<input type="checkbox"/> Grain
<input type="checkbox"/> Centre Not Concentric to O/S	<input type="checkbox"/> BOM/Route	<input type="checkbox"/> Hardware
<input type="checkbox"/> Cracks	<input type="checkbox"/> Broken/Damaged	<input type="checkbox"/> Inspection Incomplete
<input type="checkbox"/> Crushed/Crimped	<input type="checkbox"/> Burrs	<input type="checkbox"/> Instructions Incomplete/Unclear
<input type="checkbox"/> Cuffs	<input type="checkbox"/> Contamination	<input type="checkbox"/> Maintenance
<input type="checkbox"/> Heat Treat	<input type="checkbox"/> Countersink	<input type="checkbox"/> Mislabeled
<input type="checkbox"/> Inspection Strip in Tube	<input type="checkbox"/> Cut Too Short	<input type="checkbox"/> Misread
<input type="checkbox"/> Ripples in Bend	<input type="checkbox"/> Drill Holes	<input type="checkbox"/> Offset
<input type="checkbox"/> Torque Waves in Extrusion	<input type="checkbox"/> Drawing	<input type="checkbox"/> Out of Calibration
<input type="checkbox"/> Turning Sequence	<input type="checkbox"/> Finish	<input type="checkbox"/> Out of Sequence
<input type="checkbox"/> Wave/Twist in Tube	<input type="checkbox"/> Folio	<input type="checkbox"/> Outside Dimensions
		<input type="checkbox"/> Ovalized
		<input type="checkbox"/> Over/Under tolerance
		<input type="checkbox"/> Part Incorrect
		<input type="checkbox"/> Part Lost/Missing
		<input type="checkbox"/> Part Moved
		<input type="checkbox"/> Positioned Wrong
		<input type="checkbox"/> Power Loss/Surge
		<input type="checkbox"/> Pressure/Forced
		<input type="checkbox"/> Temperature/Cure
		<input type="checkbox"/> Weld
		<input type="checkbox"/> Wrong Stock Pulled
		<input type="checkbox"/> Other

Item	Qty -141	Part Number	Description
1	X	D350-748-141	CROSSTUBE ASSEMBLY (AS 350/355 HI FWD)
2	1	D6015-125	CROSSTUBE (OR D6017-115)
3	2	D3502-1	SUPPORT
4	2	D2856-400-710	ABRASION STRIP
5	1	AELS-1032-225	INSERT
6	1	NAS1149D0363J	WASHER (OR AN960JD10)
7	2	MS21920-20	CLAMP (PER DART SPEC. M-MS21920-20)
8	1	MS27039-1-10	SCREW

**GENERAL NOTES:**

- 1) MATERIAL: MANUFACTURED FROM D6015-125 OR D6017-115  
FINISHED LENGTH = 110.270±0.06
- 2) FINISH: MAGNETIC PARTICLE INSPECT PER DART QSI 038 4.2  
CADMIUM PLATE PER AMS-QQ-P-416B, CLASS 1, TYPE II  
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2  
PAINT OUTSIDE PER DART QSI 005 4.2
- 3) TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED.
- 4) UNITS: INCHES UNLESS OTHERWISE NOTED.
- 5) BREAK SHARP EDGES: 0.005 TO 0.010 MAX.
- 6) IDENTIFICATION: DART PART NUMBER "D350-748-141" AND BATCH NUMBER ON INSIDE OF CUFF  
PER DART QSI 044 6.4 (VIBRATING STYLUS)
- 7) WEIGHT: 30.45 lbs
- 8) PART IS SYMMETRIC ABOUT CENTERLINE, EXCEPT FOR Ø.297 HOLE.
- 9) BLEND OUT ALL EDGES FROM MACHINING LONGITUDINALLY, TRANSITION SHOULD BE SMOOTH.  
NOTE: ALL HOLES ARE DRILLED AFTER BENDING.
- 10) BEND PROGRESSIVELY WITH A MINIMUM OF 7 PASSES. MAXIMUM TUBE FLATTENING DUE TO BENDING IS 6% BASED ON O.D.
- 11) HEAT TREAT TO MIN. 180 KSI PER MIL-T-6736 OR AMS 2759-1C AFTER TURNING. ACCEPTABLE TO VERIFY TENSILE STRENGTH BY HARDNESS TEST PER ASTM E18 TO 40-45 HRC.
- 12) INSTALL D2856-400-710 ABRASION STRIPS WITH A GAP ON BOTTOM SIDE OF CROSSTUBE, CENTERED OPPOSITE D3502-1 SUPPORT, PER QSI 035.
- 13) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE. WHEN DRILLING HOLES EXTREME CARE MUST BE TAKEN AND CAREFUL DEBURRING PERFORMED TO ENSURE A CLEAN HOLE WITH NO CRACKING/CHIPPING/GROOVES.
- 14) TORQUE CLAMPS 60 TO 80 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING.
- 15) MAX TWIST AFTER BENDING: WITH XTUBE LAYED FLAT ON SURFACE, THE DIFFERENCE BETWEEN CUFF HEIGHTS FROM THE SURFACE MAY BE NO LARGER THAN 0.25 (ZN C1-3).

SHOP COPY  
RETURN TO  
ENGINEERING  
UNCONTROLLED COPY  
SUBJECT TO AMENDMENT  
WITHOUT NOTICE  
WORK ORDER  
NO. 84657 MCT  
12/05/31

UNDER REVIEW

11.07.12

RELEASED  
2011-01-18

F	ADD HRC TEST OPTION (B8-1) PER PAR 09-040, ADD TWIST LIMIT (A8-1, C1-3), ADD D6015-125 OPTION (C8-1), STOCK DIM NOW MACHINED (D1-4)	CP	10.11.23
E	REVISE GENERAL NOTES: UPDATE TO CURRENT ADD STANDARDS; RELOCATED FLAG #6 PER PAR 08-046 (ZN A6-3); TOLERANCES (ZN C6-3, D1-3)	RF	09.09.30
D	MAG. PARTICLE AND CAD PLATE AS MFD.	CP	06.10.31
C	ADD CAD PLATING	CP	06.08.14
B	ADD D6017-115 & PRIME AND PAINT	CP	06.06.30
A	NEW ISSUE	CP	06.03.31
REV.	DESCRIPTION	BY	DATE
DESIGN			
DRAWN			
CHECKED			
MFG. APPR.			
APPROVED			
DE APPR.			
DATE	10.11.23		

**DART AEROSPACE LTD**  
HAWKESBURY, ONTARIO, CANADA

DRAWING NO. REV. F  
D350-748-141 SHEET 1 OF 4  
TITLE SCALE  
CROSSTUBE (AS 350/355 HI FWD) NTS

COPYRIGHT © 2006 BY DART AEROSPACE LTD  
THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL AND IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS NOT TO BE REPRODUCED OR COPIED OR COMMUNICATED TO ANY OTHER PERSON WITHOUT WRITTEN PERMISSION FROM DART AEROSPACE LTD.

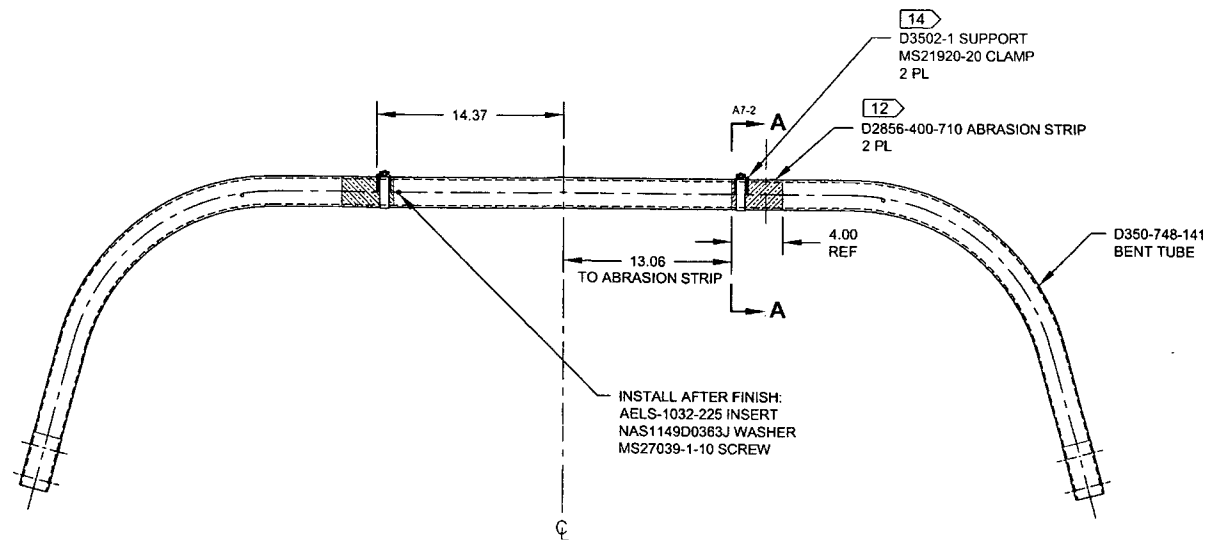
W/O:		WORK ORDER CHANGES						
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector	

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

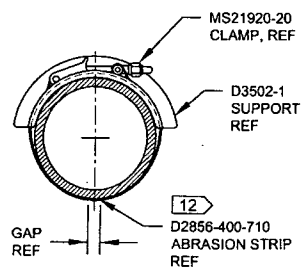
Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries



**D350-748-141  
ASSEMBLY DETAIL**



**SECTION A-A** D4-2  
SCALE 4X

UNDER REVIEW

11.07.11

**RELEASED**  
2011-01-18

DESIGN		<b>DART AEROSPACE LTD</b>	
DRAWN		HAWKESBURY, ONTARIO, CANADA	
CHECKED		DRAWING NO.	REV. F
MFG. APPR.		D350-748-141	SHEET 2 OF 4
APPROVED		TITLE	SCALE
DE APPR.		CROSSTUBE (AS 350/355 HI FWD)	NTS
DATE	10.11.23	<small>COPYRIGHT © 2006 BY DART AEROSPACE LTD THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL AND IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS NOT TO BE USED FOR ANY PURPOSE OR COPIED OR COMMUNICATED TO ANY OTHER PERSON WITHOUT WRITTEN PERMISSION FROM DART AEROSPACE LTD.</small>	

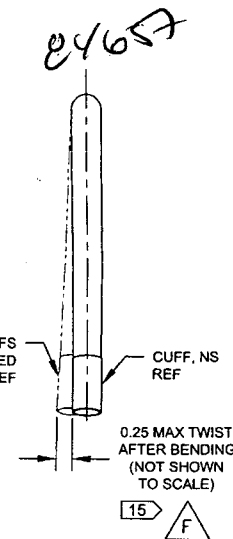
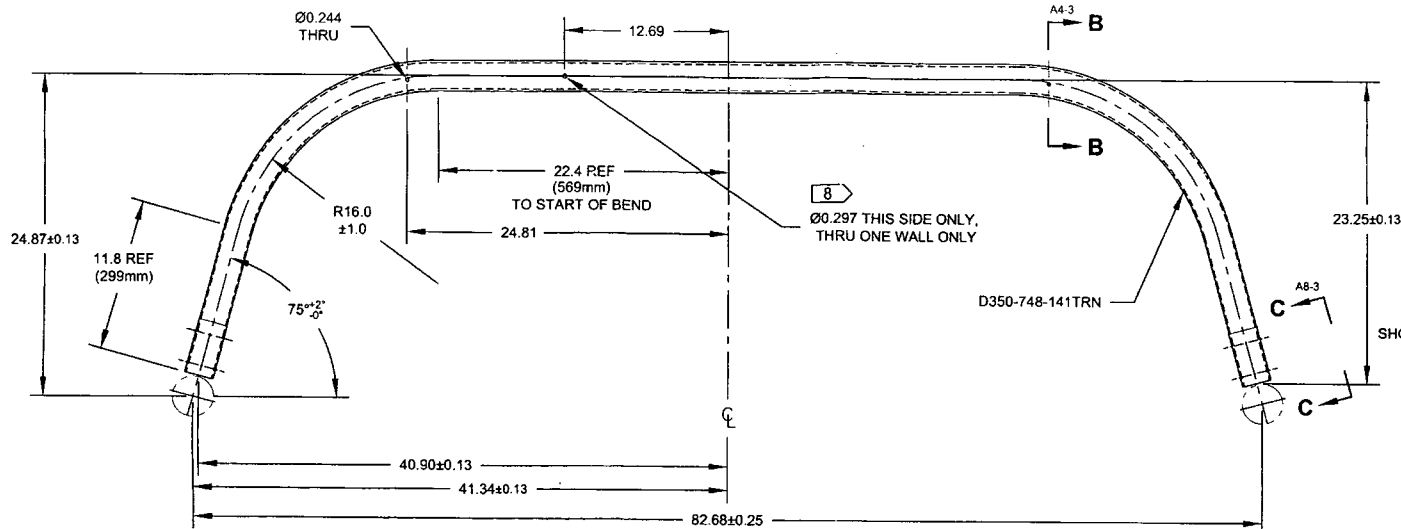
W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

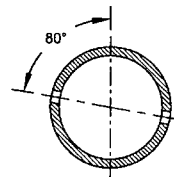
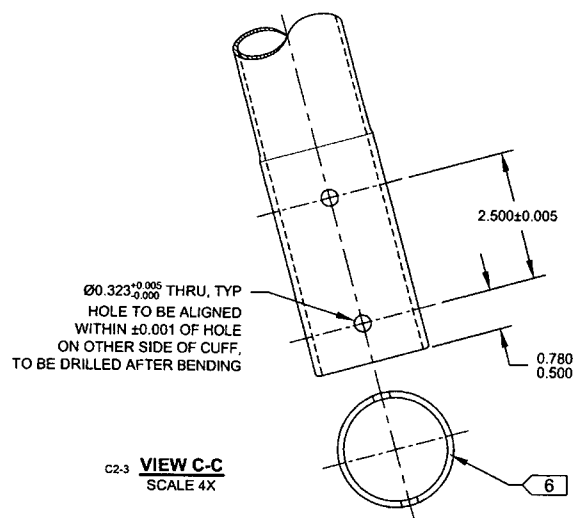
Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries



**D350-748-141**  
**BENDING AND DRILLING DETAIL** 10



UNDER REVIEW  
 11.07.12

RELEASED  
 2011-01-18

DESIGN	JP	<b>DART AEROSPACE LTD</b>	
DRAWN	JP	HAWKESBURY, ONTARIO, CANADA	
CHECKED	h	DRAWING NO.	REV. F
MFG. APPR.	h	D350-748-141	SHEET 3 OF 4
APPROVED	h	TITLE	SCALE
DE APPR.	h	CROSSTUBE (AS 350/355 HI FWD)	NTS
DATE	10.11.23	COPYRIGHT © 2006 BY DART AEROSPACE LTD THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL AND IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS NOT TO BE USED FOR ANY PURPOSE OR COPIED OR COMMUNICATED TO ANY OTHER PERSON WITHOUT WRITTEN PERMISSION FROM DART AEROSPACE LTD.	

W/O:		WORK ORDER CHANGES						
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector	

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries





W/O:		WORK ORDER CHANGES						
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector	

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries



1000 E. Mermaid La., Wyndmoor (Phila.) PA 19038-8093  
Tel. (215) 233-2600 Fax (215) 233-5653

# Invoice

Invoice Number:

0116134

Invoice Date:

Jan 10, 2013

Sold To:

DART AEROSPACE  
1270 ABERDEEN STREET  
HAWKESBURY, ON K6A 1K7

Ship To:

DART AEROSPACE  
1270 ABERDEEN STREET  
HAWKESBURY, ON K6A 1K7

Customer ID		Customer PO		Payment Terms	
DARA		PO18654		Net 30 Days	
Shop Order No.		Shipping Method		Ship Date	Due Date
75193		R & L CARRIERS		1/10/13	2/9/13
Quantity	Item	Description		Unit Price	Extension
1		1 PC. 79394 D350-748-241TRN		205.000	205.00
1		1 PC. 84657 D350-748-141TRN		205.000	205.00
1		1 PC. 84658 D350-748-141TRN		205.000	205.00
1		1 PC. 84655 D350-748-141TRN		205.000	205.00
1		1 PC. 91177 D350-748-141TRN		205.000	205.00
1		1 PC. 89962 D350-748-241TRN		205.000	205.00
1		1 PC. 89098 D350-748-241TRN		205.000	205.00
1		1 PC.		205.000	205.00

ANY DISCREPANCIES MUST BE REPORTED WITHIN 10 DAYS AFTER RECEIPT.

**We accept AMEX, Visa & Master Card**



Heat Treating and Metallurgical Consulting

Subtotal  
Shipping/Handling  
Total Invoice Amount  
Payment Received

**TOTAL**

Continued

Continued

Continued

Visit our Web Site: <[www.thomasregister.com/metlab/](http://www.thomasregister.com/metlab/)>

## Certification

### SOLD TO

Dart Aerospace Ltd.  
1270 Aberdeen Street  
Hawkesbury, ON K6A 1K7

January 10, 2013

---

<b>Metlab Shop Order No:</b>	75193
<b>Purchase Order:</b>	PO18654
<b>Description:</b>	Cross Tube
<b>Part No.:</b>	D350-748-241/141
<b>Quantity:</b>	11 Pieces
<b>Weight:</b>	400 Pounds
<b>Material:</b>	4130 Alloy Steel
<b>Specifications:</b>	Harden and temper to 180 KSI minimum ultimate tensile strength


---

This is to certify that the above parts were processed as indicated above and conform to the specification requirements.

### Results:

Ultimate Tensile Strength: 194/208 KSI\*

\*Converted from 42/44 HRC surface hardness

  
METLAB  
Quality Representative Mark Jenkins

MERCURY CONTAMINATION: During the heat treating process, testing and inspections, the product did not come in direct contact with mercury or any of its compounds nor with any mercury containing device.



Heat Treating and Metallurgical Consulting

# D 350 X-TUBE CUFF MEASUREMENTS AFTER HEAT TREATING

	TYPE	BATCH #	SIDE A TWO READINGS	SIDE B TWO READINGS
1	AFT	B89098	2.241"/2.251"	2.272"/2.214"
2	AFT	B91184	2.266"/2.221"	2.273"/2.212"
3	AFT	B91185	2.261"/2.220"	2.248"/2.234"
4	AFT	B89962	2.254"/2.234"	2.268"/2.212"
5	AFT	B79394	2.269"/2.212"	2.250"/2.243"
6	AFT			
7	AFT			
8	AFT			
9	AFT			
10	AFT			
1	FWD	B84655	2.268"/2.207"	2.246"/2.241"
2	FWD	B84656	2.253"/2.234"	2.242"/2.249"
3	FWD	B84657	2.271"/2.206"	2.251"/2.238"
4	FWD	B91177	2.244"/2.238"	2.262"/2.219"
5	FWD	B91170	2.255"/2.241"	2.285"/2.200"
6	FWD	B84658	2.272"/2.221"	2.256"/2.233"
7	FWD			
8	FWD			
9	FWD			
10	FWD			
11	FWD			
12	FWD			



13/1/24